

REMARKS

Reconsideration and allowance of the present application are respectfully requested. Claims 1-9 remain pending in the application.

On page 2 of the Office Action, various objections are raised with respect to the claims under 35 U.S.C. §112, second paragraph. By the foregoing amendments, the specific objections have been addressed such that withdrawal of this rejection is requested.

In numbered paragraph 6 of the Office Action, claims 1-9 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,783,318 (Biondo et al) in view of European Patent Document No. 1 209 247 (Nagaraj et al). These rejections are respectfully traversed, as the documents relied upon by the Examiner, considered individually or in the combination set forth in the Office Action, fail to teach or suggest Applicants' claim 1 combination, which recites, among other features, a method for strengthening grain boundaries of an article in a solid state by applying a surface diffusion process to a surface of the article. Claim 1 also recites diffusing grain boundary strengthening elements of one or a combination of boron, hafnium, zirconium along at least one grain boundary of the article to enrich the at least one grain boundary with said grain boundary strengthening elements without forming precipitates.

As described on specification page 5, exemplary embodiments can restore mechanical properties of a defect area of an article in a solid state, and thereby repair casting defects such as recrystallized grains, spurious grains, slivers, and freckles of a single crystal (SX) or a directionally solidified (DS) article.

In contrast, the Biondo patent is directed to a repaired nickel based superalloy using build-up processes which melt the repair alloy. A repair alloy is used whose composition is similar to the composition of the alloy substrate as discussed at column 6, lines 15-17. The repair alloy can contain additional grain boundary strengthener elements as discussed at column 3, lines 38-39. The repair alloy is applied to a single crystal by a low substrate heat input built-up process as described at column 3, lines 39-41. The build-up process can include laser welding, plasma transfer ARC welding and low pressure plasma spray as discussed at column 3, lines 1-4 and column 6, lines 20-22. The repair alloy is melted prior to application to the substrate as described at column 3, line 8. This patent describes, at column 1, lines 57-61, that build-up of eroded areas is required for continued operation of engines and engine components, to provide recontour to the original performance configurations and to create an erosion barrier to protect the underlying remaining substrate.

The EP Nagaraj et al document is directed to depositing a platinum aluminide bond coat for addressing high temperature performance using chemical vapor deposition. A bond coat is applied to address adhesion of a thermal barrier coating (TBC) to the underlying component as described at column 2, lines 1-2.

The Biondo and Nagaraj et al documents, considered individually or in the combination relied upon by the Examiner, fail to teach or suggest strengthening grain boundaries of an SX or DS article while in a solid state by applying a surface diffusion process to a surface of the article in a manner as recited in claim 1. These documents fail to teach or suggest using such an applied surface diffusion process to thereby diffuse grain boundary strengthening elements along a grain boundary of

the article without forming precipitates, as recited in claim 1. As such, these documents, considered individually or in the combination relied upon by the Examiner, fail to teach or suggest Applicants' claim 1 method for strengthening grain boundaries.

Claim 1 is therefore allowable. The remaining claims 2-9 depend from claim 1 and recite additional advantageous features which further distinguish over the documents relied upon by the Examiner. As such, all claim are allowable.

All objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the application is in condition for allowance and a Notice of Allowance is respectfully solicited.

Respectfully submitted,

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